

**HANDHELD PERSONAL DATA ASSISTANT (PDA)
WITH A MEDICAL DEVICE AND METHOD OF
USING THE SAME**

RELATED APPLICATIONS

[0001] This is a continuation of U.S. patent application Ser. No. 09/487,423 filed Jan. 20, 2000, which is a continuation of U.S. patent application Ser. No. 09/334,858 filed Jun. 16, 1999 that claims priority on U.S. Provisional Application Serial No. 60/096,994 filed Aug. 18, 1998, a continuation of U.S. patent application Ser. No. 09/377,472 filed Aug. 19, 1999 that claims priority on U.S. Provisional Application Serial No. 60/103,812 filed Oct. 8, 1998, a continuation of U.S. patent application Ser. No. 09/334,996 filed Jun. 17, 1999, and a continuation of U.S. patent application Ser. No. 09/246,661 filed Feb. 5, 1999—now U.S. Pat. No. 6,248,067, all of which are herein specifically incorporated by reference in their entirety.

FIELD OF THE INVENTION

[0002] This invention relates to remote programmers and/or handheld personal data assistants (PDA) for use with medical devices and, in particular embodiments, to a PDA that includes a medical device to facilitate testing and monitoring of a patient's condition with coordination of data management and programming through the PDA.

BACKGROUND OF THE INVENTION

[0003] Over the years, bodily characteristics have been determined by obtaining a sample of bodily fluid. For example, diabetics often test for blood glucose levels with a blood glucose meter. Traditional blood glucose determinations have utilized a painful finger stick using a lancet to withdraw a small blood sample that is used by the blood glucose meter. This results in discomfort from the lancet as it contacts nerves in the subcutaneous tissue. To obtain a measure of control or information on a diabetic's condition, several finger sticks and tests are required each day (8 or more such tests a day are not uncommon). The pain of lancing and the cumulative discomfort from multiple needle sticks is a strong reason why patients fail to comply with a medical testing regimen used to determine a change in characteristic over a period of time. In addition, these blood glucose meters are only designed to provide data at discrete points, and even with multiple tests a day, do not provide continuous data to show the variations in the characteristic between testing times.

[0004] A variety of implantable electrochemical sensors for use with monitors have been developed for detecting and/or quantifying specific agents or compositions in a patient's blood. For instance, glucose sensors have been developed for use in obtaining an indication of blood glucose levels in a diabetic patient. Such readings are useful in monitoring and/or adjusting a treatment regimen which typically includes the regular administration of insulin to the patient. Thus, blood glucose readings from the monitor improve medical therapies with semi-automated medication infusion pumps of the external type, as generally described in U.S. Pat. Nos. 4,562,751; 4,678,408; and 4,685,903; or automated implantable medication infusion pumps, as generally described in U.S. Pat. No. 4,573,994, which are herein incorporated by reference. Typical thin film sensors are

described in commonly assigned U.S. Pat. Nos. 5,390,671; 5,391,250; 5,482,473; and 5,586,553 which are incorporated by reference herein. See also U.S. Pat. No. 5,299,571. However, the monitors and electrochemical sensors often require calibration using readings obtained from blood glucose meters to augment and adjust for drift over time. Thus, although the monitors and electrochemical sensors provide more accurate trend information, a separate blood glucose meter is still often required.

[0005] A user must often carry multiple devices to test different aspects of the same value or characteristic. For instance, the a user would need a blood glucose meter and blood glucose monitor. In addition, individuals are also carrying other electronic devices, such as an infusion device, cellular telephones, personal entertainment systems (such as radios, cassette players, CD players, or the like). They may also include small personal computers, personal data assistants (PDAs) or the like. Thus, users often carry a large number of separate electronic devices, which can be cumbersome and inconvenient to handle.

SUMMARY OF THE DISCLOSURE

[0006] It is an object of an embodiment of the present invention to provide an improved remote programmer and/or personal data assistant (PDA) that includes a characteristic monitor and/or a characteristic meter, which obviates for practical purposes, the above mentioned limitations.

[0007] According to an embodiment of the present invention a remote programmer for interfacing with at least one medical device includes at least one medical device module, at least one processor, a housing, at least one input/output port, at least one display, at least one button, at least one audio indication device and at least one portable power supply. The at least one medical device module is operatively coupled with the remote programmer and includes at least one medical device interface to interface with the at least one medical device. The at least one processor is to interface with the remote programmer and is coupled to the at least one medical device interface to process data from the at least one medical device. The housing is adapted to contain the medical device module and the at least one processor. The at least one input/output port is for communicating with the at least one medical device. The at least one display includes at least one touch screen element to interface with the at least one of the at least one processor and the at least one medical device. The at least one button is to interface with at least one of the at least one processor and the at least one medical device, and the at least one audio indication device is coupled to the at least one processor to provide an audio indication. The at least one portable power supply is contained within the housing of the remote programmer to provide power to at least one of the at least one processor and the at least one medical device. In still further embodiments, the at least one medical device is an infusion device, a characteristic monitor, a characteristic meter, an analyte sensor patch and/or more than one medical device. In other embodiments, the remote programmer is personal data assistant (PDA).

[0008] In particular embodiments, the at least one medical device module has a separate housing that is adapted to couple with the housing of the remote programmer. In other embodiments, the at least one medical device is a charac-